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Indian Standard

SPECIFICATION FOR CARDBOARD TUBES USED AS CORES FOR JUTE FABRIC ROLLS

(First Revision)

UDC 676·831 : 677·884·23 : 677·13·064

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 4 *August* 1983

Indian Standard

SPECIFICATION FOR CARDBOARD TUBES USED AS CORES FOR JUTE FABRIC ROLLS

(First Revision)

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR CARDBOARD TUBES USED AS CORES FOR JUTE FABRIC ROLLS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 5 February 1983, after the draft finalized by the Jute Mill Accessories and Jute Machinery Spare Parts Sectional Committee had been approved by the Textile Division Council.

0.2 This standard is being revised in the light of the experience already gained and the implementation difficulties being faced by the industry and trade after its publication in 1973. While revising this standard, opportunity has also been availed for covering several new varieties, the need for which has already been felt by the industry.

0.3 The Standards of Weights and Measures Act, 1976 stipulates use of the International System of Units in the country; in order to familiarize the industry with this system, the recommended SI units for use in the textile industry are given in Appendix A.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for cardboard tubes used as cores for jute fabric rolls.

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*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Lot — The quantity of cores purporting to be of one definite type, internal diameter, wall thickness and length, delivered to one buyer against one despatch note.

2.2 Beam Strength — The maximum load a tube can withstand without breaking when applied at constant rate of traverse through a harness at the centre of the length of the tube between two end supports situated at a standard distance.

2.3 Flexural Breaking Tenacity — It is the ratio between the beam strength and weight per unit length of the tube.

2.4 Warpage (Curvature) — The maximum deviation of the outer surface longitudinally from the linearity.

3. GENERAL REQUIREMENTS

3.1 The tube should be made of layers of paper or cardboard preferably conforming to IS : 2617-1967* and/or IS : 1397-1967†, using a suitable bonding agent in between the layers.

3.2 The tubes should be of circular cross section.

3.3 A rustproof cap of metal of suitable synthetic material, rounded at the folds and edges, may be fitted on each end of the tube as agreed to between the buyer and the seller.

3.3.1 The cap, when used, shall be sealed firmly on the tube without causing any appreciable change in the outer and inner diameters of the tube at the ends.

4. SPECIFIC REQUIREMENTS

4.1 The tube shall conform to the requirements laid down in Table 1.

5. MARKING

5.1 Each tube shall be marked at a suitable place with the following:

a) Manufacturer's name and trade-mark, if any;
b) Lot number;

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*Specification for millboard, greyboard and strawboard (*first revision*).

†Specification for kraft paper (*first revision*).

TABLE 1 REQUIREMENTS FOR CARDBOARD TUBE FOR ROLLING JUTE FABRIC

[*Clauses* 4.1 *and* 5.1(f)]

Variety	Nominal Internal Dia	Nominal Wall Thickness	Nominal Mass on Contract Moisture Regain Basis (Linear Density)	Beam Strength on 183 cm Length			Nominal Length	Warpage, *Max*	Moisture Regain Percent	
				Grade 1	Grade 2	Grade 3			Permissible *Max*	Contract
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	cm	cm	kg/m	kgf	kgf	kgf	cm	percent		
1.	7·6	1·27	2·4	121 & above	110 to 120	90 to 109	As agreed to between the buyer and seller	0·5	12	10
2.	7·6	1·6	3·0	141 & above	130 to 140	110 to 129				
3.	7·6	1·9	3·4	151 & above	140 to 150	120 to 139				
4.	8·9	1·27	2·7	161 & above	145 to 160	120 to 144				
5.	8·9	1·6	3·6	226 & above	195 to 225	160 to 194				
6.	8·9	1·9	4·4	266 & above	235 to 265	200 to 234				
7.	8·9	2·2	5·1	296 & above	265 to 295	225 to 264				
8.	8·9	2·5	5·9	336 & above	305 to 335	260 to 304				
9.	8·9	2·9	6·9	356 & above	325 to 355	275 to 324				
10.	10·2	1·27	3·1	181 & above	155 to 180	130 to 154				
11.	10·2	1·6	3·9	251 & above	230 to 250	195 to 229				
12.	10·2	1·9	4·7	296 & above	205 to 295	225 to 264				
13.	10·2	2·2	5·6	346 & above	315 to 345	265 to 314				
14.	10·2	2·5	6·4	401 & above	360 to 400	305 to 359				
Tolerance	+ 0·3 − 0	+ 20 − 5 percent	+ 20 − 5 percent	—	—	—	+ 3 − 0	—	—	—
Method of test	B-1	B-2	—	B-3	B-3	B-3		B-4	B-5	B-5

NOTE 1 — No individual reading of the internal diameter should be less than the nominal value by more than 5 mm.

NOTE 2 — 1 N (Newton) is approximately equal to 0·102 kgf.

c) Nominal length;

d) Nominal internal diameter;

e) Nominal wall thickness; and

f) Grade corresponding to beam strength (*see* Table 1).

5.1.1 The tube may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. PACKING

6.1 For internal market, packing shall be done as agreed to between the buyer and the seller.

6.2 For export market, packing shall be made within a suitable wooden crate after being wrapped with suitable moistureproof material.

7. SAMPLING

7.1 The conformity of a lot to the requirements of this standard shall be arrived at on the basis of the results of the tests carried out on the samples drawn from it.

7.2 The number of tubes to be drawn at random shall be in accordance with col 1 and 2 of Table 2.

7.3 To ensure randomness of selection, methods given in IS : 4905-1968* may be followed.

7.4 All the tubes selected as in **7.2** shall be inspected for internal diameter, wall thickness, mass per metre length, warpage and moisture regain.

7.5 The number of tubes to be tested for beam strength shall be in accordance with col 4 of Table 2.

---

*Methods for random sampling.

TABLE 2 SAMPLE SIZE AND PERMISSIBLE NUMBER OF NON-CONFORMING TUBES

(*Clauses* 7.2, 7.5 *and* 8.1)

NUMBER OF TUBES IN THE LOT	NUMBER OF TUBES TO BE SELECTED	SUB-SAMPLE SIZE FOR BEAM STRENGTH	PERMISSIBLE NUMBER OF NON-CONFORMING TUBES
(1)	(2)	(3)	(4)
Up to 100	5	2	0
101 ,, 150	8	2	0
151 ,, 300	13	3	0
301 ,, 500	20	5	1
501 and above	32	8	2

8. CRITERIA FOR CONFORMITY

8.1 The lot shall be considered to be conforming to the requirements of this standard if the following conditions are satisfied:

a) The number of tubes found defective for any one or more of the characteristics given in **7.4** does not exceed the coresponding number given in col 4 of Table 2, and

b) None of the tubes tested for beam strength fail to satisfy the specified requirement.

APPENDIX A

(*Clause* 0.3)

RECOMMENDED SI UNITS FOR TEXTILES

Sl No.	*Characteristic*	*SI Unit*		*Application*
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
1.	Length	Millimetre	mm	Fibres
		Millimetre, centimetre	mm, cm	Samples, test specimens (as appropriate)
		Metre	m	Yarns, ropes, cordage, fabrics

Sl No.	*Characteristic*	*SI Unit*		*Application*
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
2.	Width	Millimetre	mm	Narrow fabrics
		Centimetre	cm	Other fabrics
		Millimetre, centimetre	mm, cm	Samples, test specimens (as appropriate)
		Centimetre, metre	cm, m	Carpets, druggets, *DURRIES* (as appropriate)
3.	Thickness	Micrometre (micron)	µm	Delicate fabrics
		Millimetre	mm	Other fabrics, carpets, felts
4.	Linear density	Tex	tex	Yarns
		Millitex	mtex	Fibres
		Decitex	dtex	Filaments, filament yarns
		Kilotex	ktex	Slivers, ropes, cordage
5.	Diameter	Micrometre (micron)	µm	Fibres
		Millimetre	mm	Yarns, ropes, cordage
6.	Circumference	Millimetre	mm	Ropes, cordage
7.	Threads in fabric:			Woven fabrics (as appropriate)
	a) Lengthwise	Number per centimetre	ends/cm	
		Number per decimetre	ends/dm	
	b) Widthwise	Number per centimetre	picks/cm	
		Number per decimetre	picks/dm	

Sl No.	*Characteristic*	*SI Unit*		*Application*
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
8.	Warp threads in loom	Number per centimetre	ends/cm	Reeds
9.	Stitches in knitted fabric:			Knitted fabrics (as appropriate)
	a) Lengthwise	Courses per centimetre Courses per decimetre	courses/cm courses/dm	
	b) Widthwise	Wales per centimetre Wales per decimetre	wales/cm wales/dm	
10.	Stitch length	Millimetre	mm	Knitted fabrics, made-up items
11.	Mass per unit area	Grams per square metre	g/m^2	Fabrics
12.	Mass per unit length	Grams per metre	g/m	Fabrics
13.	Twist	Turns per centimetre Turns per metre	turns/cm turns/m	Yarns, ropes, cordage (as appropriate)
14.	Test or gauge length	Millimetre, centimetre	mm, cm	Fibre, yarn and fabric specimens (as appropriate)
15.	Breaking load	Millinewton	mN	Fibres, delicate yarns (individual or skeins)
		Newton	N	Strong yarns (individual or skeins), ropes, cordage, fabrics

Sl No.	*Characteristic*	*SI Unit*		*Application*
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
16.	Breaking length	Kilometre	km	Yarns
17.	Tenacity	Millinewton per tex	mN/tex	Fibres, yarns (individual or skeins)
18.	Twist factor or twist multiplier	Turns per centimetre × square root of tex Turns per metre × square root of tex	$\text{turns/cm} \times \sqrt{\text{tex}}$ $\text{turns/m} \times \sqrt{\text{tex}}$	Yarns (as appropriate)
19.	Bursting strength	Newton per square centimetre	N/cm^2	Fabrics
20.	Tear strength	Millinewton, newton	mN, N	Fabrics (as appropriate)
21.	Pile height	Millimetre	mm	Carpets
22.	Pile density	Mass of pile yarn in grams per square metre per millimetre pile height	$\text{g/m}^2\text{/mm}$ pile height	Pile carpets
23.	Elastic modulus	Millinewton per tex per unit deformation	mN/tex/unit deformation	Fibres, yarns, strands

APPENDIX B

(*Table* 1)

METHODS OF TEST FOR CARDBOARD TUBES FOR JUTE FABRIC ROLLS

B-1. MEASUREMENT OF INTERNAL DIAMETER

B-1.1 Scope — This method provides for measuring the inside diameter of the tubes.

B-1.2 General — The core needs a perfect fit without much effort or slackness on the shaft of the rolling mechanism for efficient operation.

B-1.3 Apparatus — An inside micrometer graduated in 0·025 mm or inside calipers with a suitable vernier scale.

B-1.4 Procedure — Position the micrometer or the calipers inside the sample tube diametrically, avoiding measurement at burrs, seams and cracks. Read the micrometer or vernier scale directly. Measure at both ends of the tube and calculate the average of the readings correct to the nearest millimetre.

B-2. MEASUREMENT OF WALL THICKNESS

B-2.1 Scope — This method provides for measuring the wall thickness of cardboard tubes by a hand micrometer or vernier calipers.

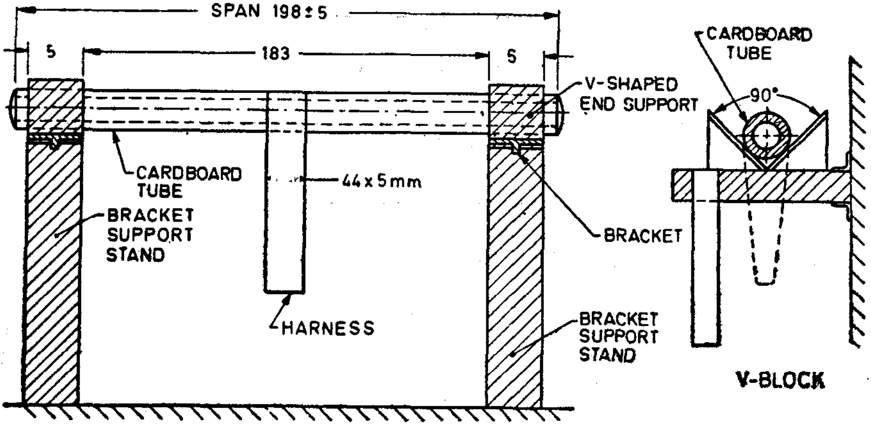
B-2.2 General — The wall thickness of the core is important since an appreciable variation in wall thickness results in small ballooning in the first few metres of the fabric near the bite of the pressing roller during rolling the fabric on the tube causing weft distortion in the fabric.

B-2.3 Apparatus — A hand micrometer with extended anvil at right angles to spindle, graduated in 0·025 mm, or vernier calipers.

B-2.4 Procedure — Measure the wall thickness of the tube at four places at an interval of about 90° with the micrometer or vernier calipers avoiding seams, laps, cutting burrs and corners. Record measurements to the nearest 0·1 mm and calculate the average of all the readings.

B-3. DETERMINATION OF BEAM STRENGTH

B-3.1 Scope — This method provides for measuring the beam strength of the tube by a constant-rate-of-traverse fabric strength tester with suitable extra attachments and fittings (*see* Fig. 1)



All dimensions in millimetres.

FIG. 1 FIXING OF SAMPLE IN STRENGTH TESTER

B-3.2 General — The tube has to withstand high pressure load on account of compact rolling of jute fabric under tension. The flexural breaking tenacity is a measure for comparing the quality characteristics of the tubes varying is internal diameter and wall thickness.

B-3.3 Apparatus — A constant-rate-of-traverse fabric strength tester having measuring range 454 kg_f (extended, if needed, to 700 kg_f by adding extra weight on the pendulum) and rate of traverse 46 cm/min provided with:

a) an arrangement to hold the tube by two V-shaped supports situated 183 cm apart and having an angle of approximately 90° between the arms of V-shaped support which shall be 5 cm wide; and

b) a thick harness made from cotton webbing of width 44 mm and thickness 5 mm, approximately, having a loop at one end to grip the tube and the other end attached to one end of a flexible steel tape of requisite strength, the other end of the steel tape being fixed to the upper jaws of the machine, after being laced round a freely rotating pulley fixed on the lower jaws.

B-3.4 Procedure — Place the tube under test on the V-shaped end supports in such a way that the harness is at the centre of the length of the tube between the supports and about 5 cm of the tube projects out of each end support. Perform the test at the rate of 46 ± 1 cm/min traverse of the lower grip and record the reading to the nearest kg_f. Avoid testing tubes which have noticeable indentations or injuries within 45 cm of either side of the harness.

B-4. DETERMINATION OF WARPAGE

B-4.1 Scope — This method provides for the measurement of the warpage (concave bowing) on the full length of the test sample.

B-4.2 General — The bowing of the core can significantly affect the jute fabric and cause distortion in the weft for a considerable length of the fabric rolled on it. This weft distortion in the fabric may result in distortion of the pattern of the pile surface in the case of tufted fabrics.

B-4.3 Procedure — Lay the tube flat on a smooth floor. Hold a thin string straight and parallel to the axis of the tube touching the circumference of the tube at its two ends. Rotate the tube around its axis under this condition. Measure the noticeable maximum deviation of the surface of the core from the string to the nearest millimetre and record in centimetres. Similarly find the maximum deviation for other test samples.

B-4.4 Calculation — Calculate the average of the deviations in centimetres and express as percentage of the length in centimetres of the tube.

B-5. DETERMINATION OF MOISTURE REGAIN

B-5.1 Scope — This method provides for measuring the moisture regain of cardboard tubes both by oven dry method as well as electronic moisture meter.

B-5.1.1 Since the oven dry method is time consuming it should be used as reference method only. For routine testing, the moisture regain may be determined by electronic moisture meter.

B-5.2 General — The presence of extra moisture in the tube due to inadequate drying after manufacture would result in its failure in certain characteristics apart from damaging the inner layer of the fabric rolled on it.

B-5.3 Apparatus

B-5.3.1 *Air Oven* — electrically heated, capable of maintaining temperature at 105 ± 3° C.

B-5.3.2 *Pan Balance* — to read in grams.

B-5.3.3 *Electronic Moisture Meter*

NOTE — Transistorized moisture meter with pointed spikes at the end of the electrode may be used for the purpose.

B-5.4 Procedure — Either of the procedures given below may be used for the determination of moisture regain of the tube.

B-5.4.1 *Oven Dry Method* — Cut a piece of 30 cm from the middle part of each of the tubes selected for this test (*see* **7.4**). Take total mass of the cut pieces and then dry these in an oven maintained at a temperature of 105 ± 3°C for 4 hours or until a constant minimum mass of the specimens is attained. Calculate the moisture regain using the following relationship:

$$\text{Moisture regain, percent} = \frac{(M_o - M_d)}{M_d} \times 100$$

where

M_o = original mass of the specimens in grams, and

M_d = dry mass of the specimens in grams.

B-5.4.2 *By Electronic Moisture Meter* — Press the electrode at different parts of tube and take the readings of the moisture meter. Take at least 5 readings on each tube and find the average moisture regain from the readings obtained.

B-6. REPORT

B-6.1 The test report should give the following information:

a) Lot number,

b) Identification of the samples,

c) Average internal diameter of each sample,

d) Average wall thickness of each sample,

e) Length of each sample,

f) Beam strength of each sample,

g) Warpage of each sample,

h) Average moisture regain of each sample, and

j) Corrected mass of each sample.